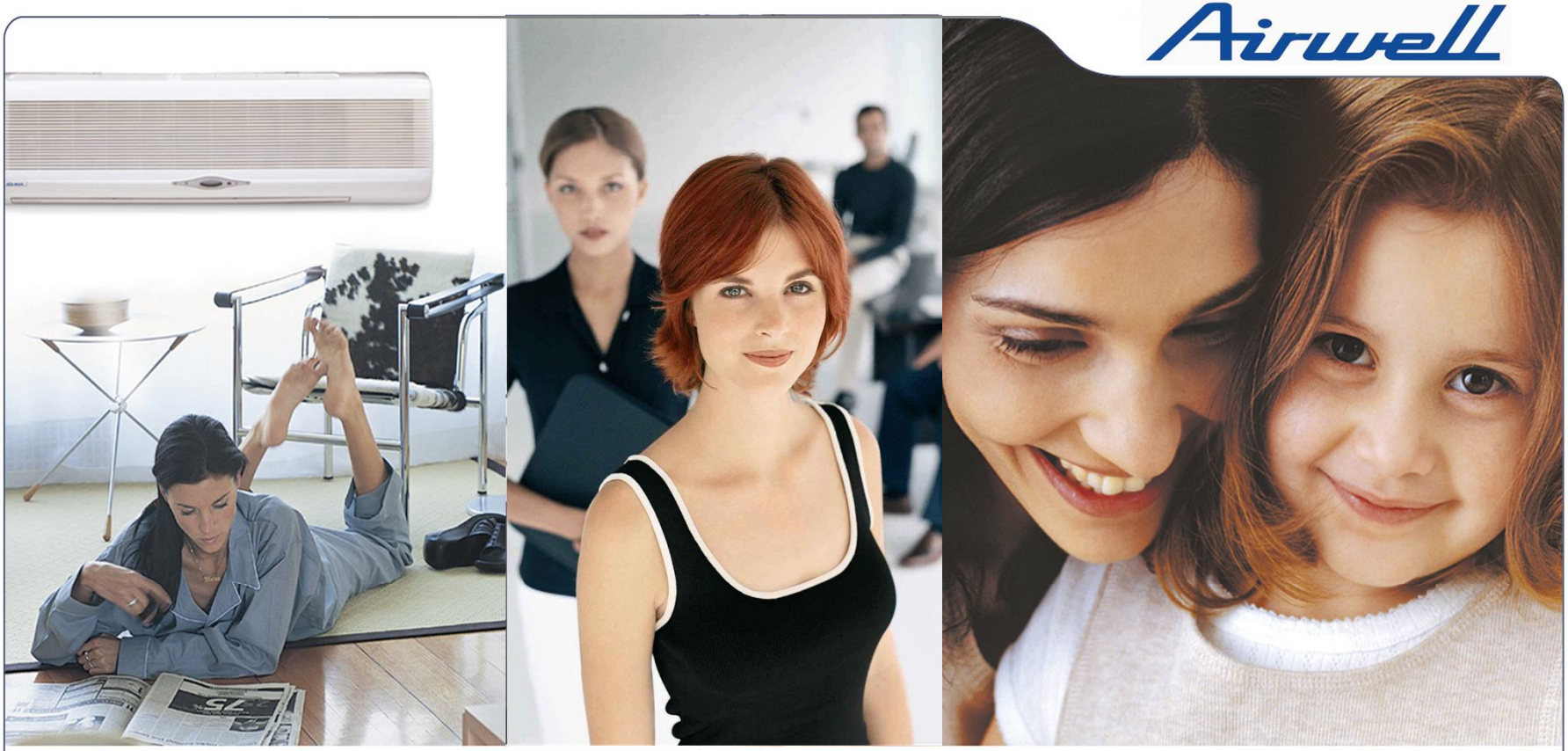

HDD/HED
Training Presentation
Presented By : Yossi Emquies

Jan 12th 2011

Product Description

– The HDD/HED series is a DCI monosplit wall-mounted air conditioner designed mainly for residential applications.

–The ODU (YDD) is equipped with a DC compressor, using sine wave and torque control technology providing comfort and economical operation.

–The HDD/HED series includes the following main 4 models capacities :

9 kBtu/h
12kBtu/h
18kBtu/h
24kBtu/h.

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Product Range Appearance

Airwell

DC INVERTER

R-410A

Airwell- HDD 009/012
Johnson- DDH 009/012

Airwell- HDD 018
Johnson- DDH 018

Airwell- HDD 024
Johnson-DDH 024

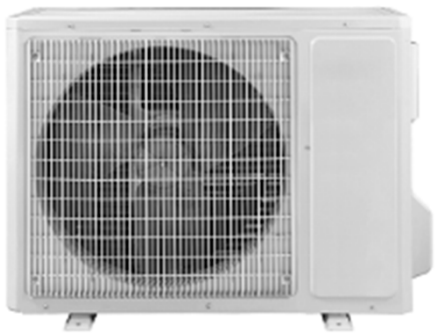
Airwell- HED 009/012
Electra-JED 009/012

Airwell- HED 018
Electra- JED 018

Airwell- HED 024
Electra- JED 018

Airwell- YDD 009/012
Electra- VDD 009/012
Johnson- DDY 009/012

Airwell- YDD 018/024
Electra- VDD 018/024
Johnson- DDY 018/024



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Main Key Features

- DC inverter technology.
- R410A models.
- Microprocessor control equipped with indoor 2 segment display .
- High COP, Energy efficiency class A in cooling/heating mode.
- Torque control for compressor.
- Cooling operation at outdoor temperature up to 48ºC.
- Heating operation at outdoor temperature down to -15ºC.
- Easy installation and service.
- Sleep mode.
- ON/OFF timer and clock display.
- Vertical auto swing with motorized flap.
- Intergraded protection logic control.
- Turbo Mode.
- I-Feel function.
- Hot Keep in heating mode.
- Clean function (Blow dry).
- Self diagnostics (Error indications) for ease of maintenance.

Specifications

	Indoor units Outdoor units		HDD 009 AWSI-HDD009-N11 AWAU-YDD009-H11	HDD 012 AWSI-HDD012-N11 AWAU-YDD012-H11	HDD 018 AWSI-HDD018-N11 AWAU-YDD018-H11	HDD 024 AWSI-HDD024-N11 AWAU-YDD024-H11
Cooling	**Capacity**	kW	**2.65 (0.45-3.23)**	**3.53 (0.6-3.96)**	**5.3 (1.05-6.5)**	**6.45 (1.4-7.0)**
	Power input	kW	0.8	1.1	1.6	2
	EER/Energy Label		3.3 / A	3.21 / A	3.31 / A	3.22 / A
	Operating limits	°C	10°/ 48° Dry bulb	10°/ 48° Dry bulb	5°/ 46° Dry bulb	5°/ 46° Dry bulb
Heating	**Capacity**	kW	**3.52 (0.45-4.1)**	**4.1 (0.6-5.13)**	**5.8 (1.0-7.1)**	**6.7 (1.2-8.0)**
	Power input	kW	0.95	1.14	1.6	1.85
	COP/Energy Label		3.7 / A	3.61 / A	3.62 / A	3.62 / A
	Operating limits	°C	-15°/ 24° Dry bulb	-15°/ 24° Dry bulb	-15°/ 30° Dry bulb	-15°/ 30° Dry bulb
Indoor units	Sound pressure level (SH/H/M/L)	dB(A)	41/36/30/24	42/37/31/25	45/40/37/29	48/44/39/34
	Sound power level (SH/H/M/L)	dB(A)	51/46/40/34	52/47/41/35	55/50/47/39	58/54/49/44
	Airflow (SH/H/M/L)	m^3/h	630/520/370/280	680/560/410/300	800/680/560/460	1000/800/700/550
	Dehumidification	l/h	0.8	1.5	3	4
	Dimensions (WxDxH)	mm	770x201x283	770x201x283	865x215x305	1008x221x319
	Weight	kg	8	9	12	15
	Part number		**7SP022852**	**7SP022853**	**7SP022854**	**7SP022855**
Outdoor units	Sound pressure level	dB(A)	47	48	54	56
	Sound power level	dB(A)	57	58	64	66
	Airflow	m^3/h	1600	1600	2700	2900
	Compressor type		Rotary DC Inverter	Rotary DC Inverter	Twin Rotary DC Inverter	Twin Rotary DC Inverter
	Dimensions (WxDxH)	mm	658x275x550	658x275x550	955x424x700	955x396x700
	Weight	kg	28	30	52	55
	Part number		**7SP061774**	**7SP061775**	**7SP061776**	**7SP061777**
Power supply 1-230V - 50Hz	Power supply side		Indoor	Indoor	Indoor	Indoor
	Power cable section	mm^2	3x1.5	3x1.5	3x2.5	3x2.5
	Fuse rating	A	16A	16A	25A	25A
	Electrical connections	mm^2	4x1.5	4x1.5	4x2.5	4x2.5
Pipe line	Suction pipe diameter	inches	3/8"	3/8"	1/2"	1/2"
	Liquid pipe diameter	inches	1/4"	1/4"	1/4"	1/4"
	Max lenght	m	15	15	25	25
	Max height	m	5	5	10	10

[1]Data are relative to Low speed, Medium speed and High speed.
Nominal heating capacity: International conditions 20°C/12°C wet bulb - Outside air temperature: 7°C/6°C wet bulb.
Nominal cooling capacity: International conditions (NF EN 255.2 / 814.2 standards) - 27°C/19°C wet bulb - Outside air temperature: 35°C/24°C wet bulb. Global acoustic pressure in dB(A) (1 m) at nominal conditions: outdoor unit in an open area against a reflective background - indoor unit: installation in an average sized room. (PV-0,5s reverberation).

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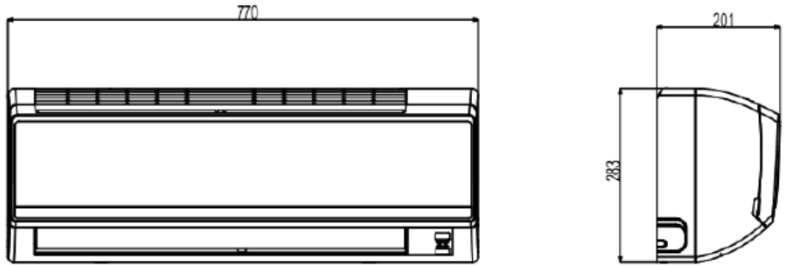
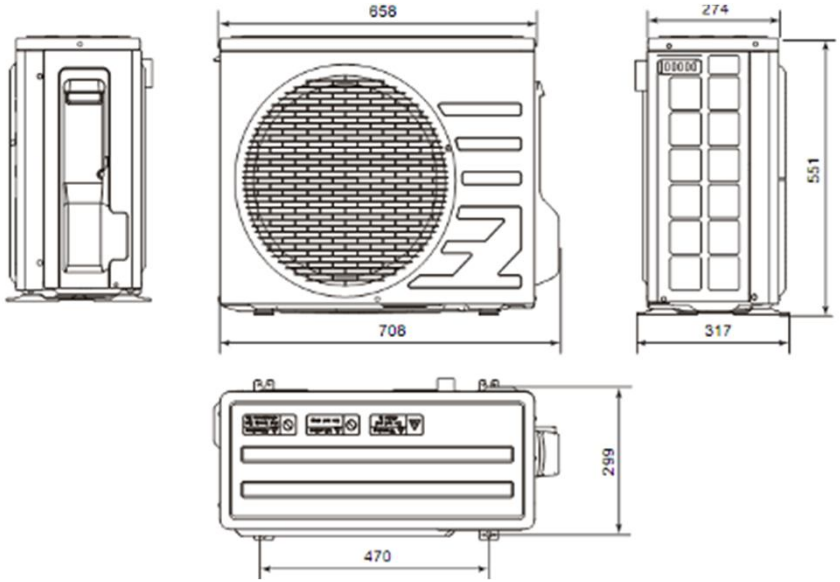
Out Line Dimensions

(Model 09/12)

Indoor Unit



Outdoor Unit



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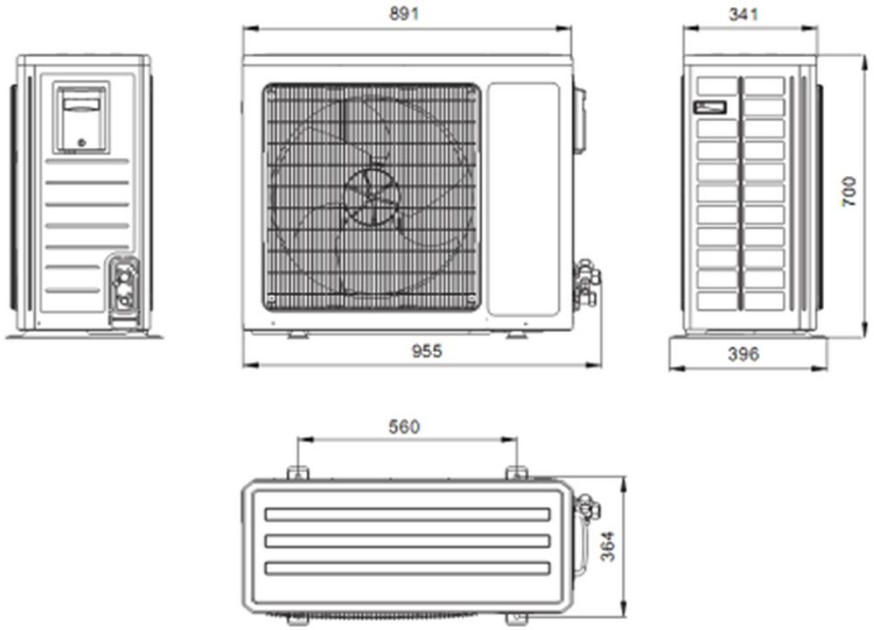
Out Line Dimensions

(Model 18/24)

Indoor Unit

Model	W(mm)	H(mm)	D(mm)
18K	865	305	215
24K	1008	319	221

Outdoor Unit



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TECHNICAL ASPECTS

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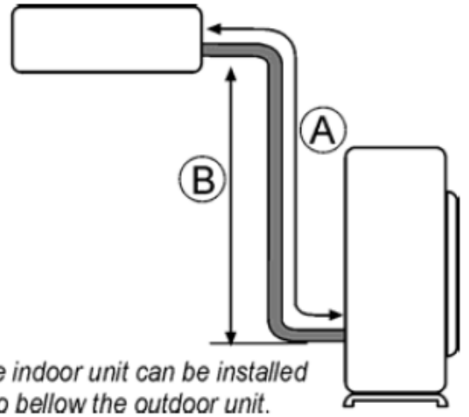
Installation

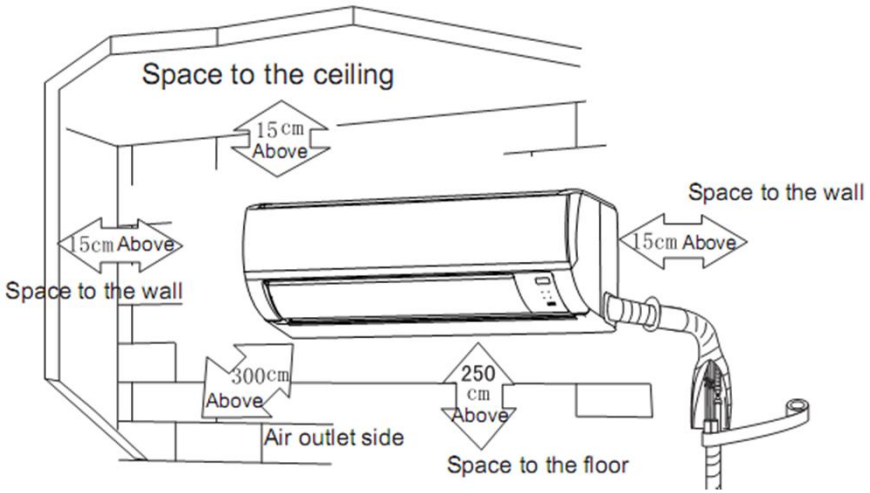
MAXIMUM PIPES LENGTH & HEIGHT					
NOM. CAPACITY (kBtu/h)	TUBES O.D.	LENGTH (A)	HEIGHT (B)	PRECHARGE LENGTH	ADDITIONAL CHARGE
09	1/4" – 3/8"	15	5	5	15g/m
12	1/4" – 3/8"	15	5	5	15g/m
18	1/4" – 1/2"	25	10	5	20g/m
24	1/4" – 1/2"	25	10	5	20g/m



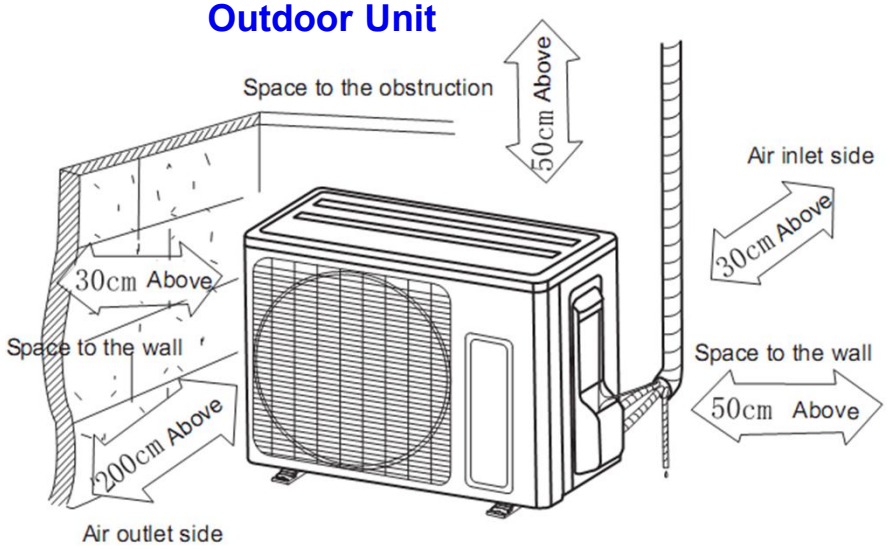
The indoor unit can be installed also bellow the outdoor unit.

Constrains of installation:

indoor Unit



Outdoor Unit



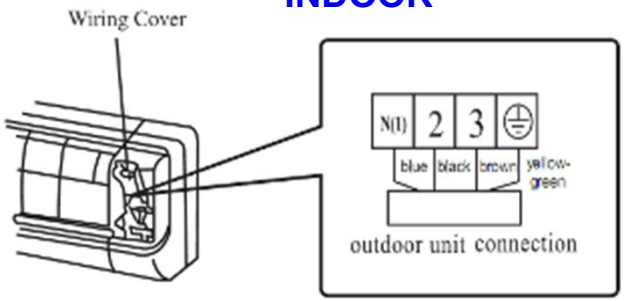
Intermediate Wiring Connection

Airwell DC INVERTER R-410A

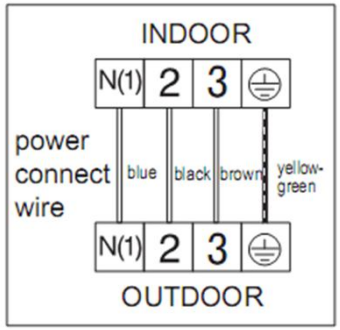
INDOOR 09/12

INDOOR 18/24

INDOOR

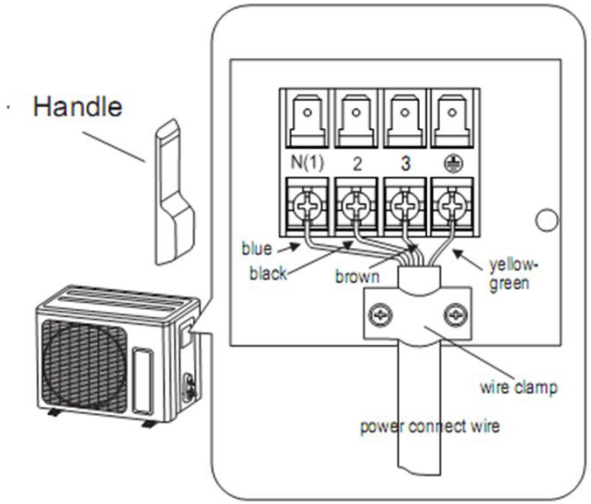


INDOOR/OUTDOOR CONNECT FIG



OUTDOOR 09/12/18/24

OUTDOOR



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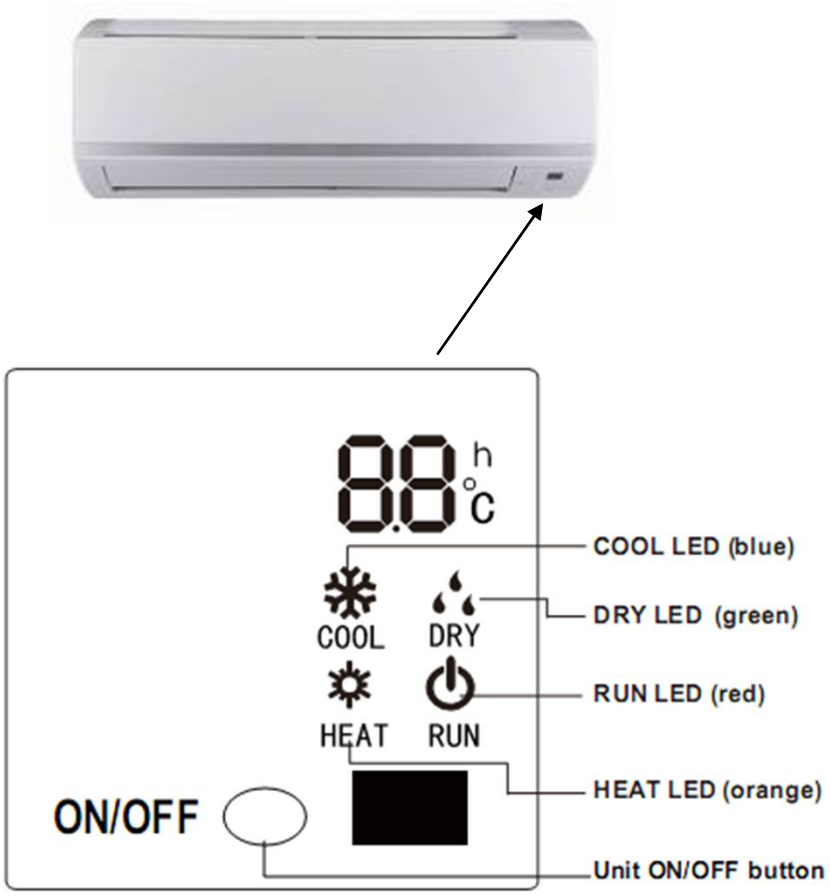
IDU Main Display



INTRODUCTION OF FUNCTION

RUN INDICATOR	1.Lights up when the Air Conditioner is connected to power and the mode is STBY. 2.When the unit is turned on remotely, the RUN LED goes out while the current setting running mode is displayed
COOL INDICATOR DRY INDICATOR HEAT INDICATOR	1.Lights up during specified operation mode (COOL/DRY/HEAT).
2* 7 segments display	1.In normal situation, the setting temperature is displayed. 2.Shows outdoor temperature or indoor temperature when receiving the corresponding demand from controller. It resumes displaying setting temperature 5s later 3.Shows H1 during deicing in heating mode. 4.Shows the alarm code whenever there is an alarm. (Refer to Diagnostics part)
Unit ON/OFF Button	**Short pressing (Less than 5s)** : Unit will switch between Auto mode and STBY. System will select the COOL/HEAT/FAN mode automatically and temperature/Fan speed settings can not be changed. **Long pressing (5~10s):** System will enter into Force cooling operation.

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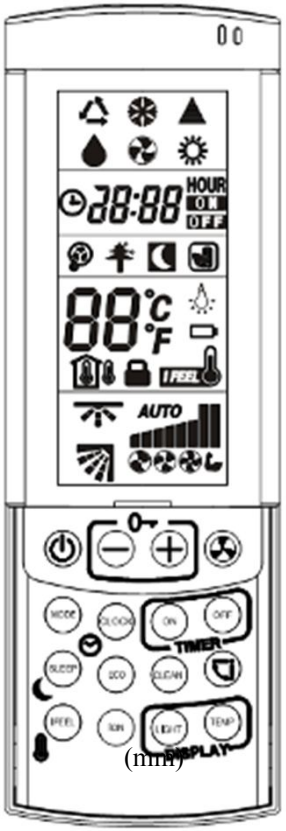
RCO8-A Controller Main Functions

RC08-A



(mm)

Main Functions

- Choose the operating mode (Heating-Dry-Fan or Automatic mode).
- Increase or decrease the setting temperature.
- Adjust the fan speeds (Auto/Turbo/High/Medium/Low)
- Setting ON-OFF timer or present time.
- Sleep mode.
- Self Clean function.
-"I FEEL" function.
- Flap position selection: Any position selection
- Low Battery (Power) alarm

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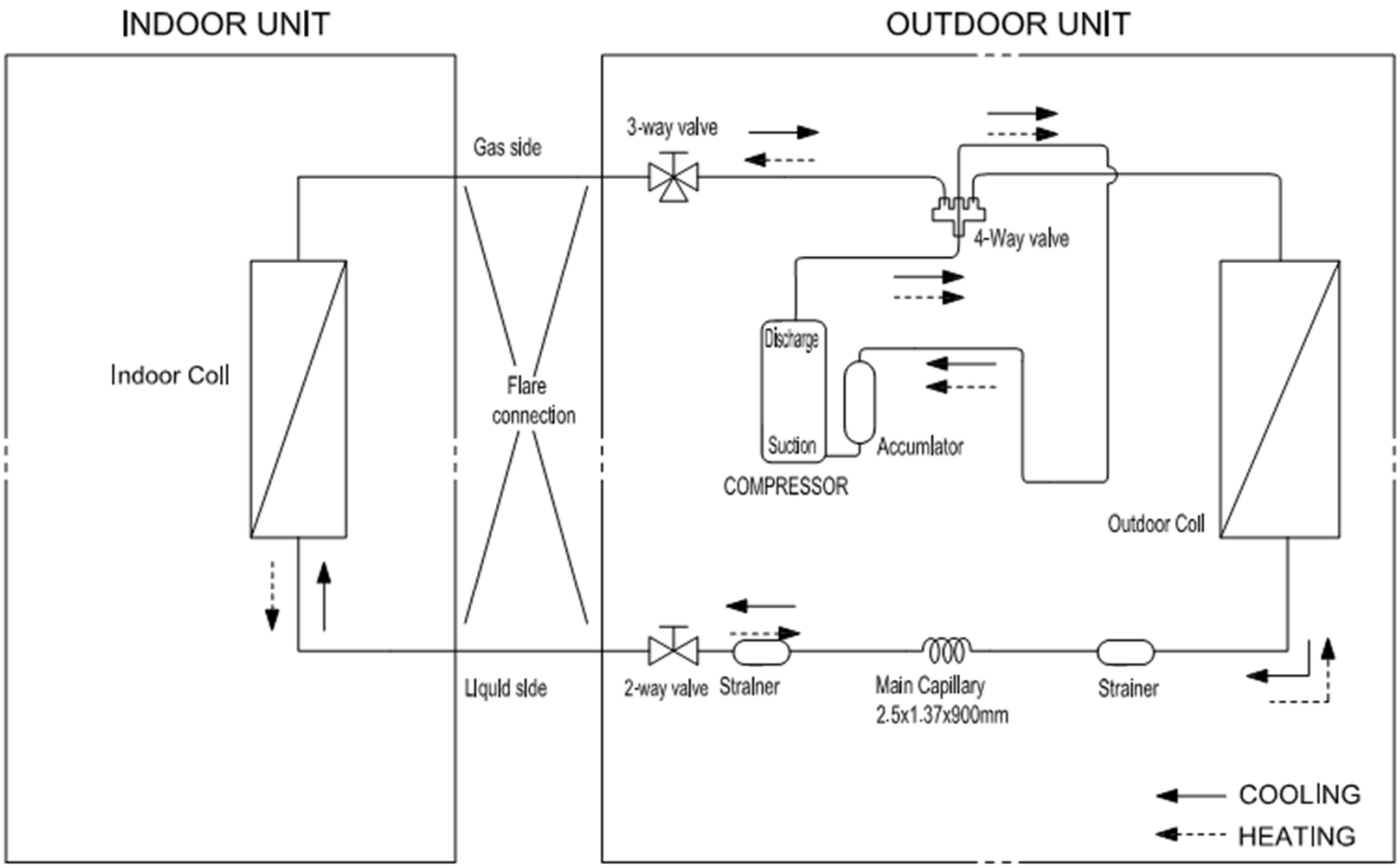
Refrigerant Diagram

(Model 09)



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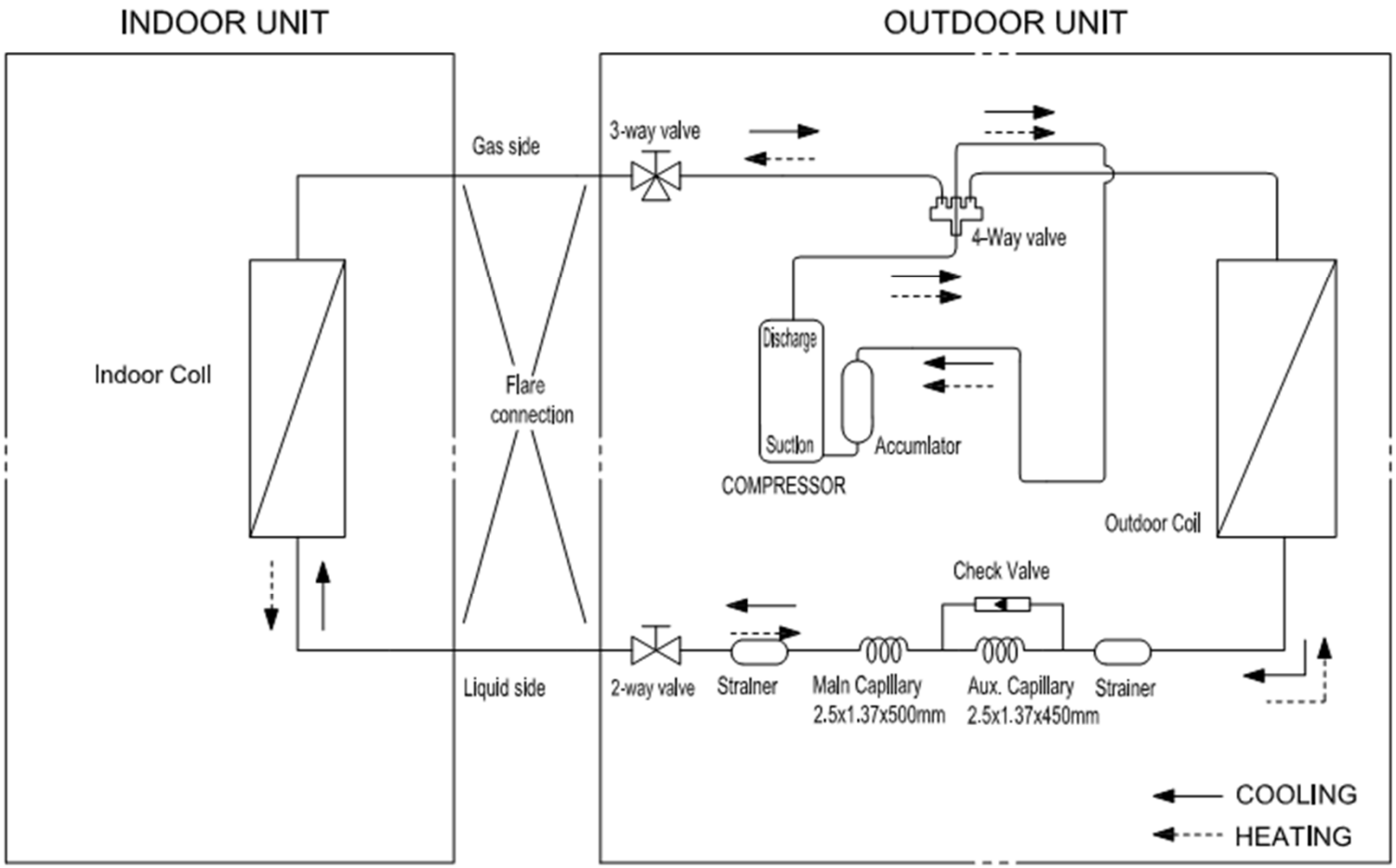
Refrigerant Diagram

(Model 12)



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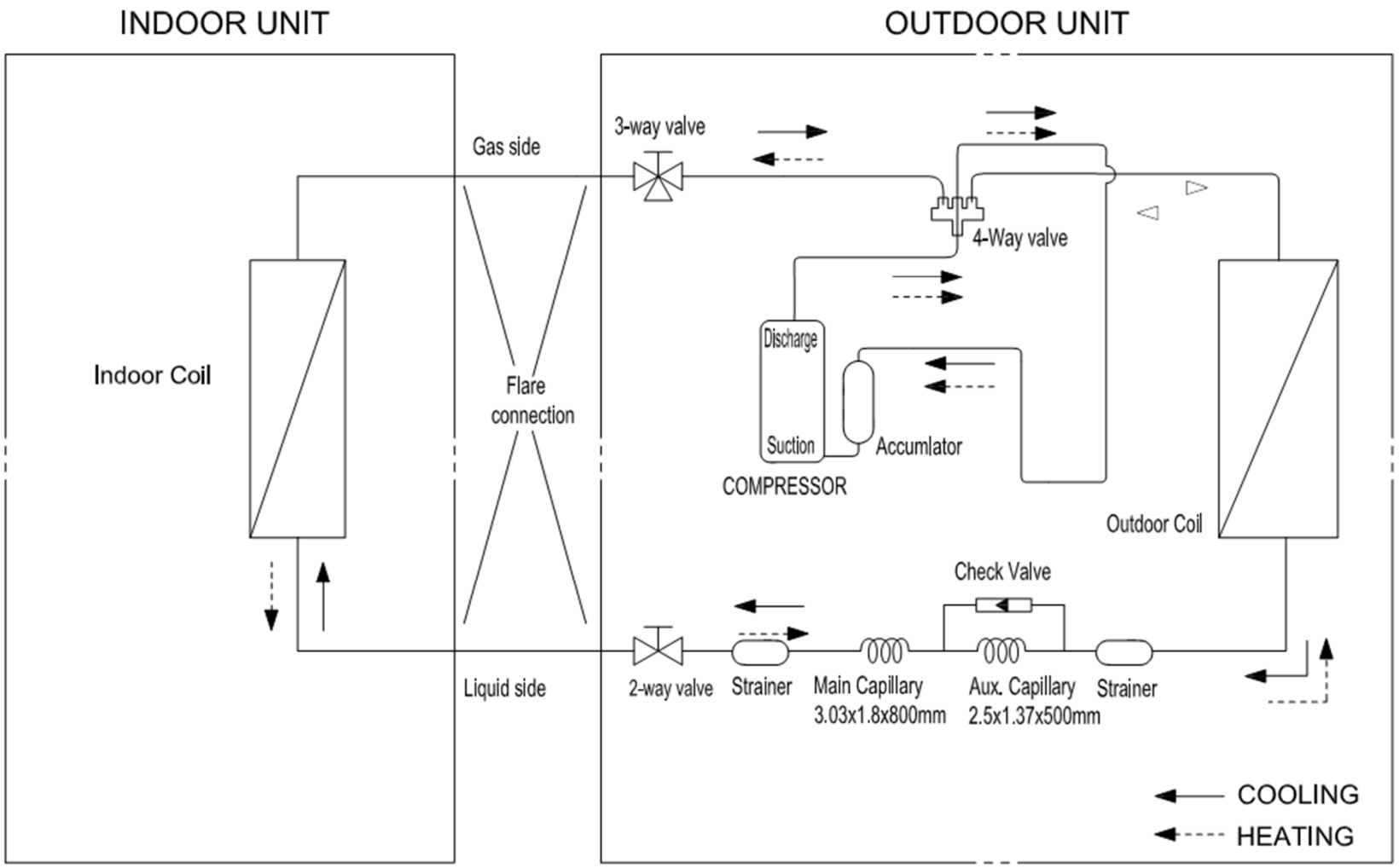
Refrigerant Diagram

(Model 18)



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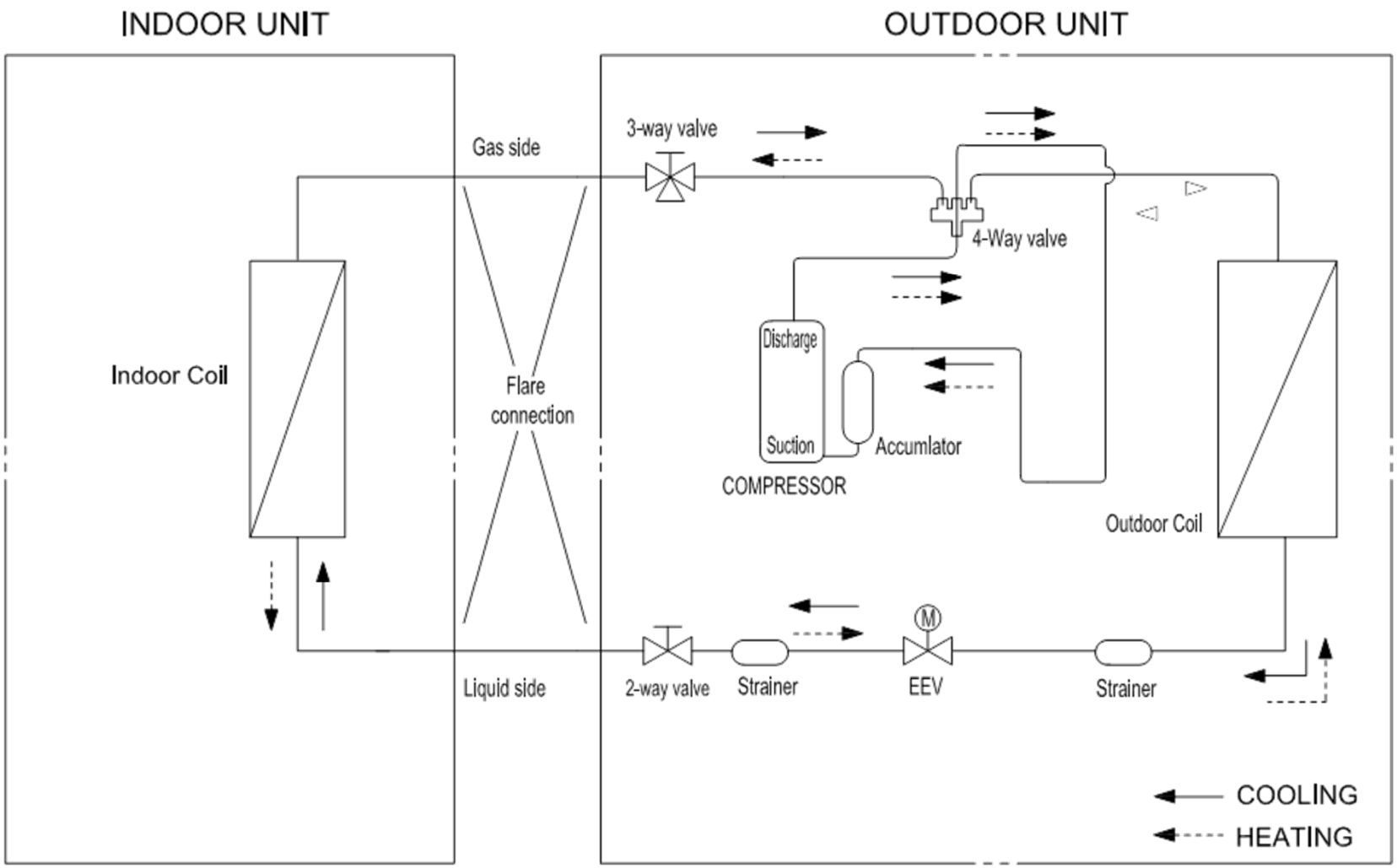
Refrigerant Diagram

(Model 24)



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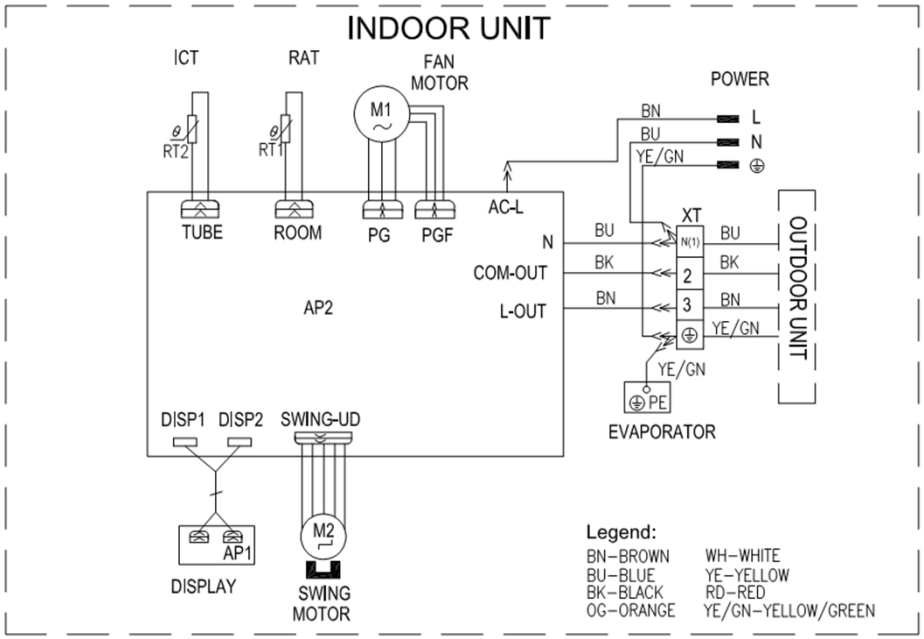
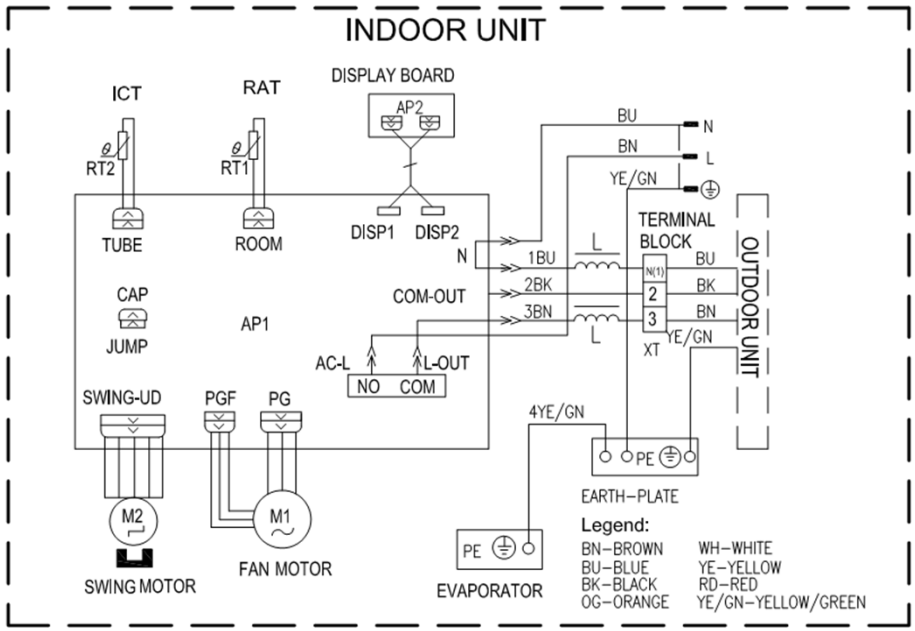
Wiring Diagram IDU

INDOOR- 09/12



INDOOR- 18/24



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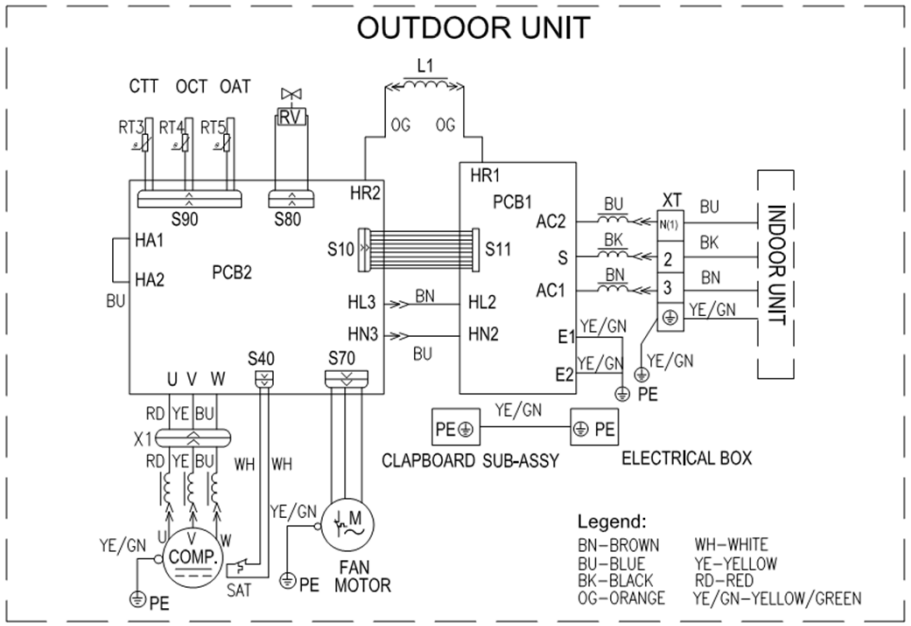
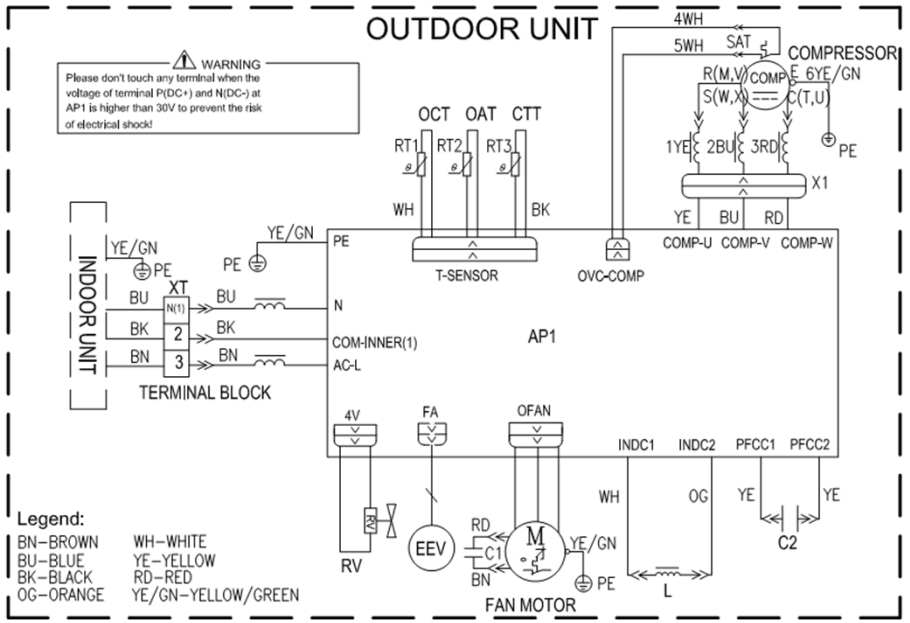
Wiring Diagram ODU

OUTDOOR- 09/12



OUTDOOR- 18/24



*** EEV is only for Model 24**

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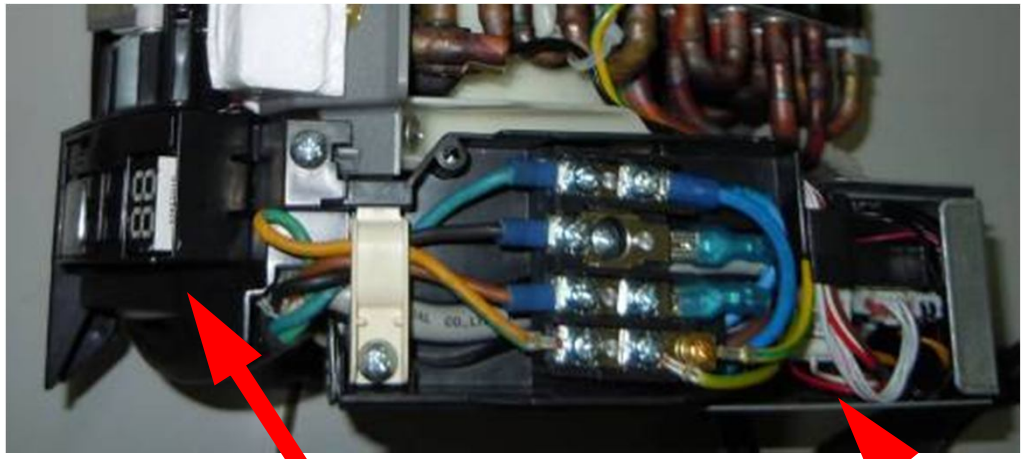
IDU PCB Main Inputs and Outputs Layout

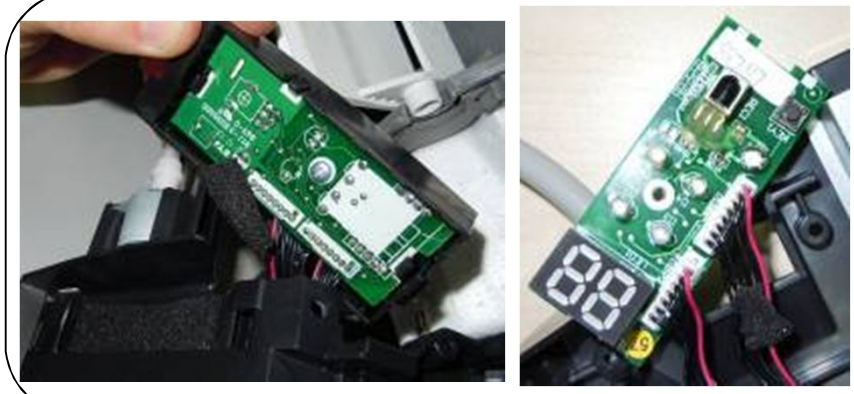
(Indoor Model 09/12)

Indoor controller of model 09/12



* Model 09/12 use similar controller but with different SW.

IDU Display



IDU Main Board

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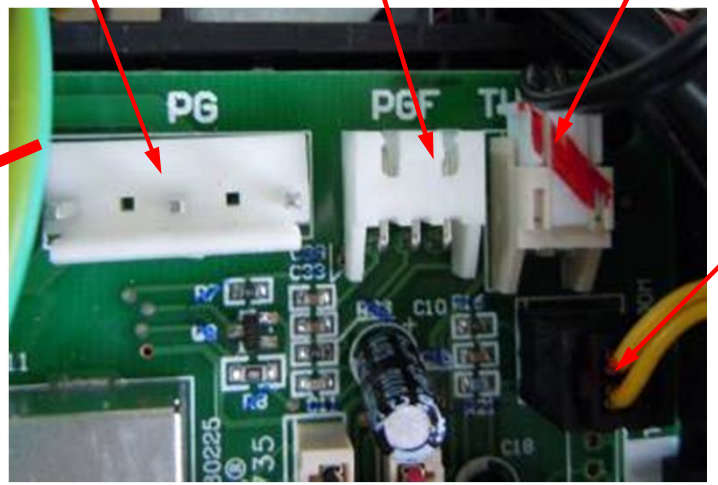
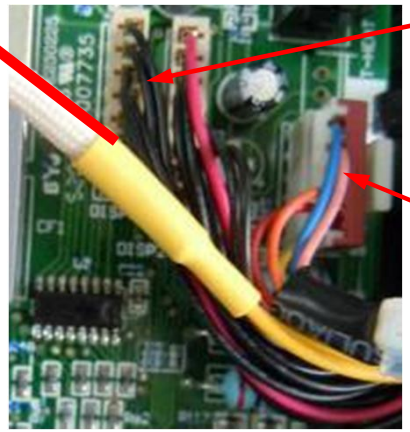
IDU PCB Main Inputs and Outputs Layout
(Indoor Model 09/12)

Indoor Main Board of model 09/12





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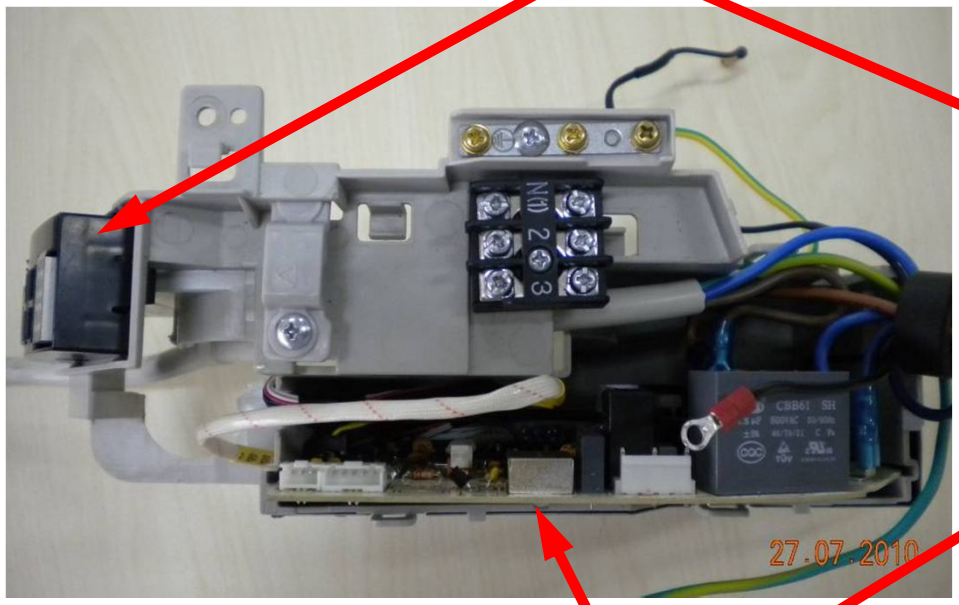
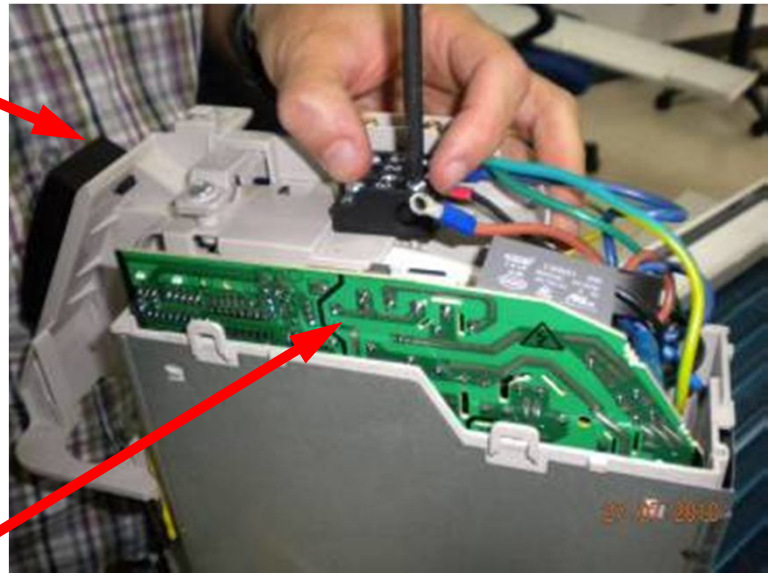
IDU PCB Main Inputs and Outputs Layout

(Indoor Model 18/24)

Indoor controller of model 18/24

IDU Display





IDU Main Board

* Model 18/24 use similar controller but with different SW and Capacitor

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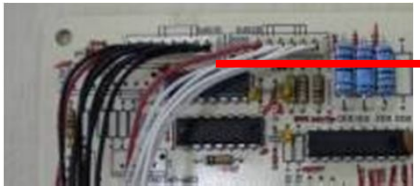
IDU PCB Main Inputs and Outputs Layout
(Indoor Model 18/24)

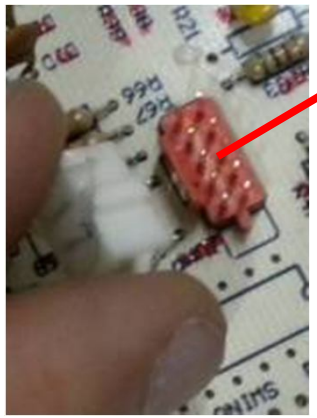
Indoor Main Board of model 18/24

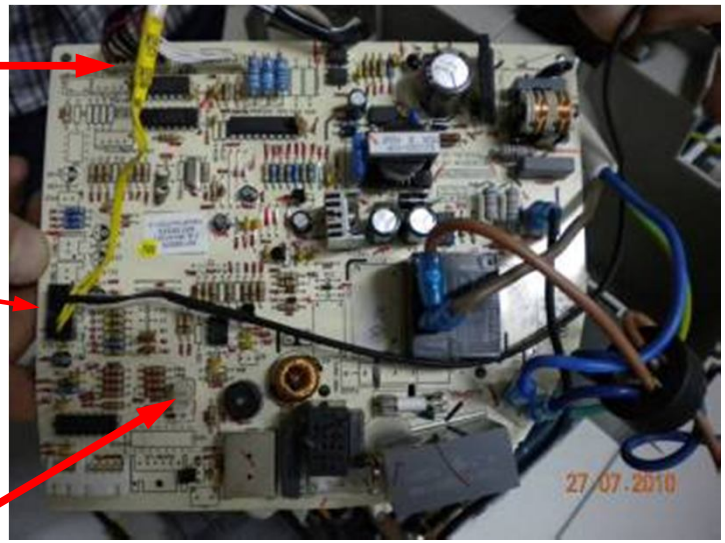
To Display

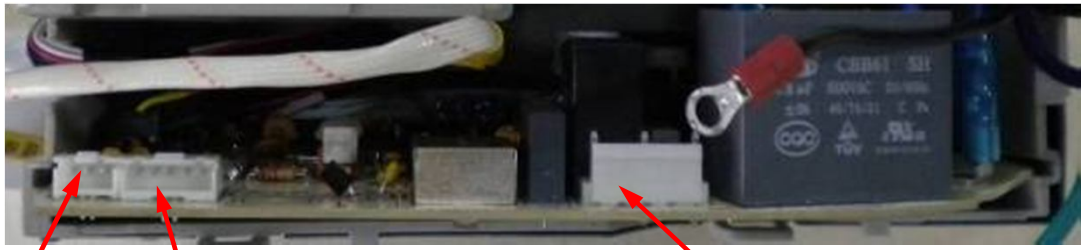


ICT,RAT

Model Plug







PG motor Feedback

Louver motor

PG Motor Power

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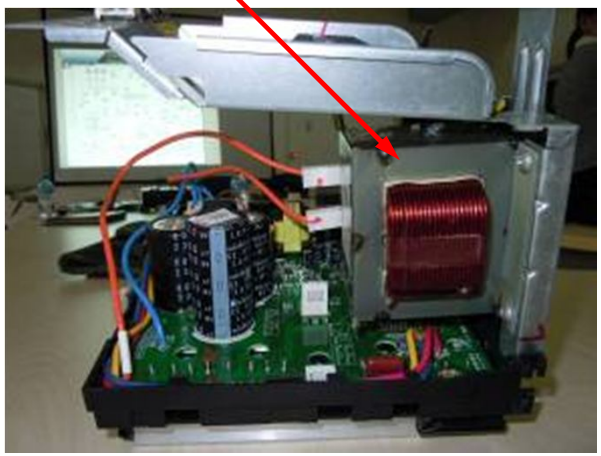
ODU PCB Main Inputs and Outputs Layout
(Outdoor 09/12)

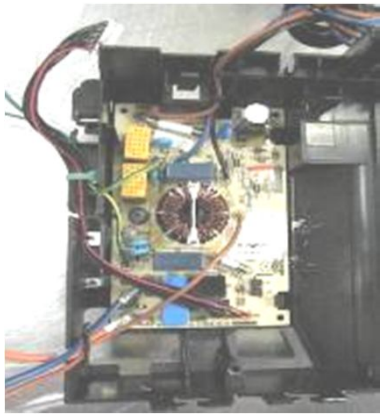
Outdoor controller of model 09/12

* Model 09/12 use similar controller
but with different SW

PFC Reactor



EMI Filter



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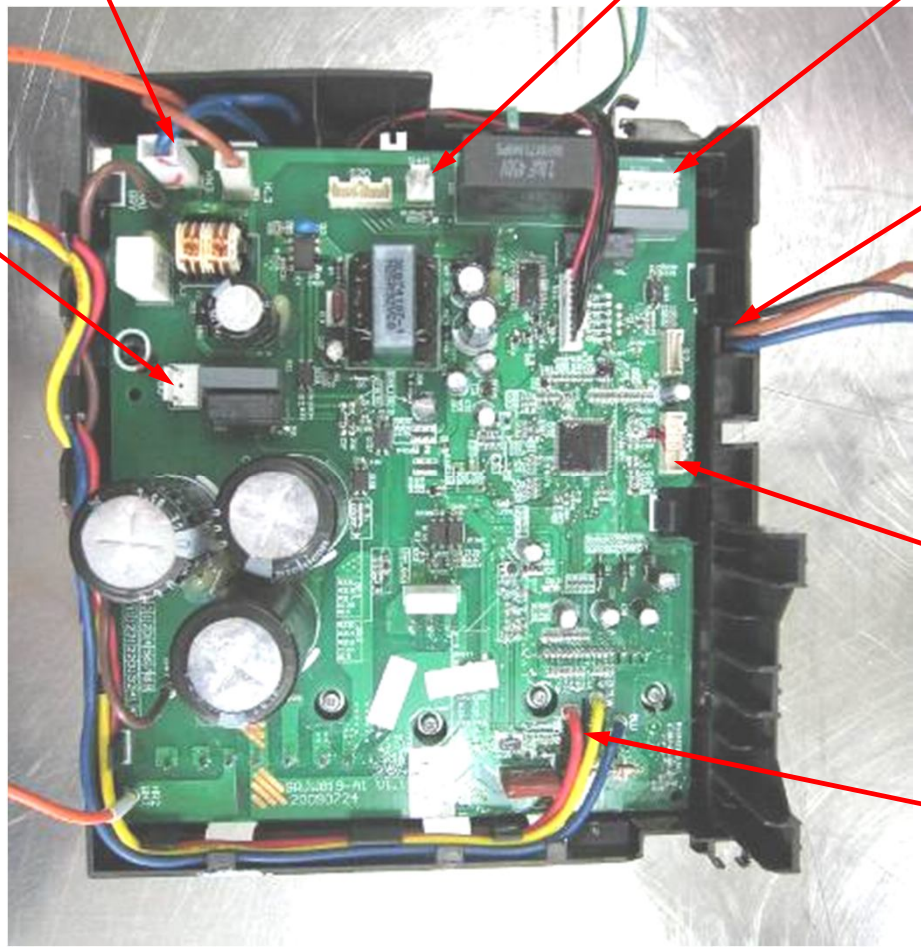
ODU PCB Main Inputs and Outputs Layout

(Outdoor 09/12)

ODU Main Board of model 09/12



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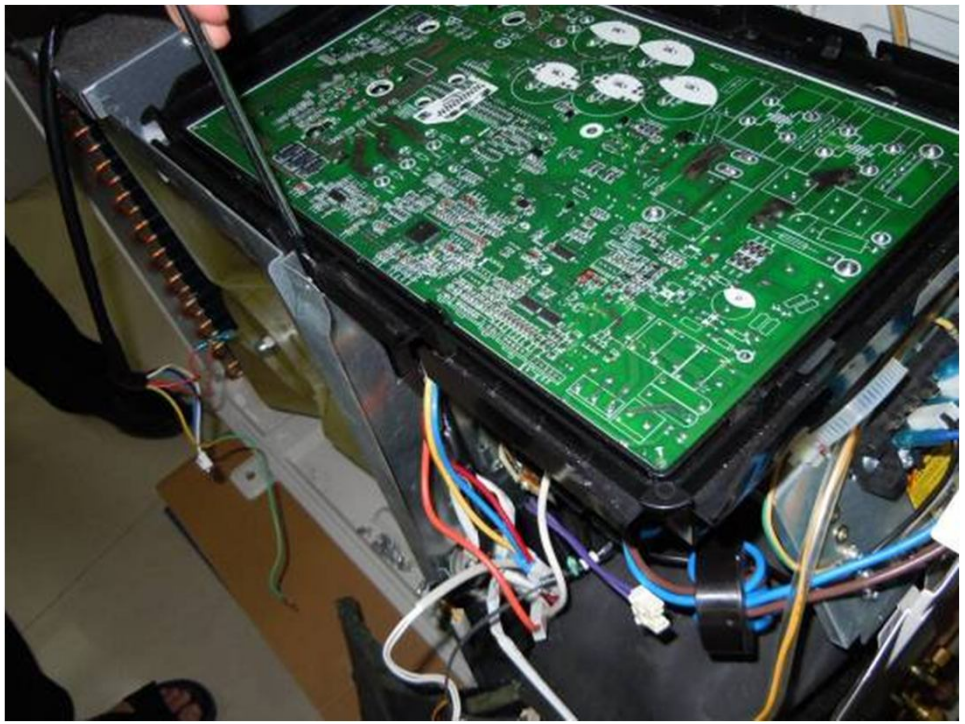
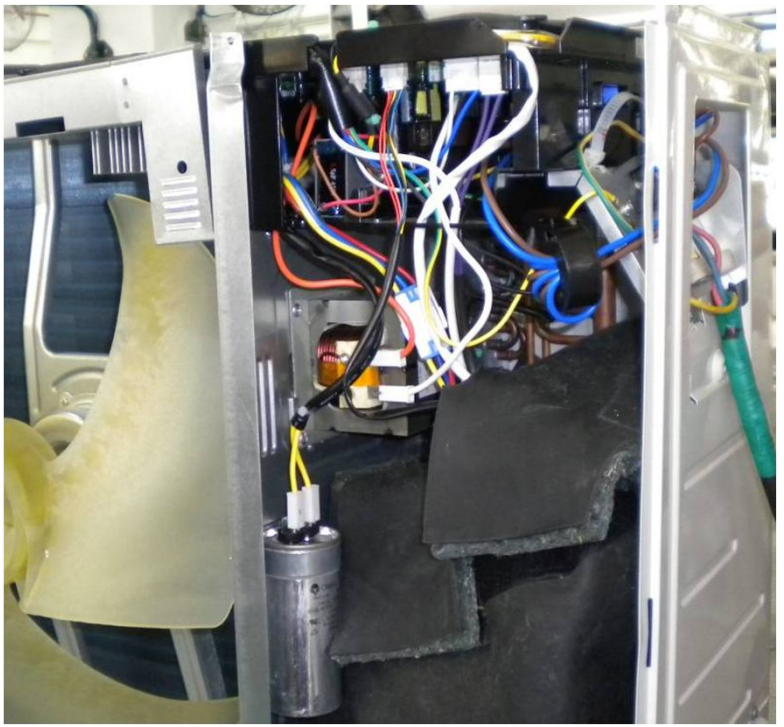
ODU PCB Main Inputs and Outputs Layout
(Outdoor 18/24)

Outdoor controller of model 18/24
– Flat PCB combines Main Board and EMI Filter together





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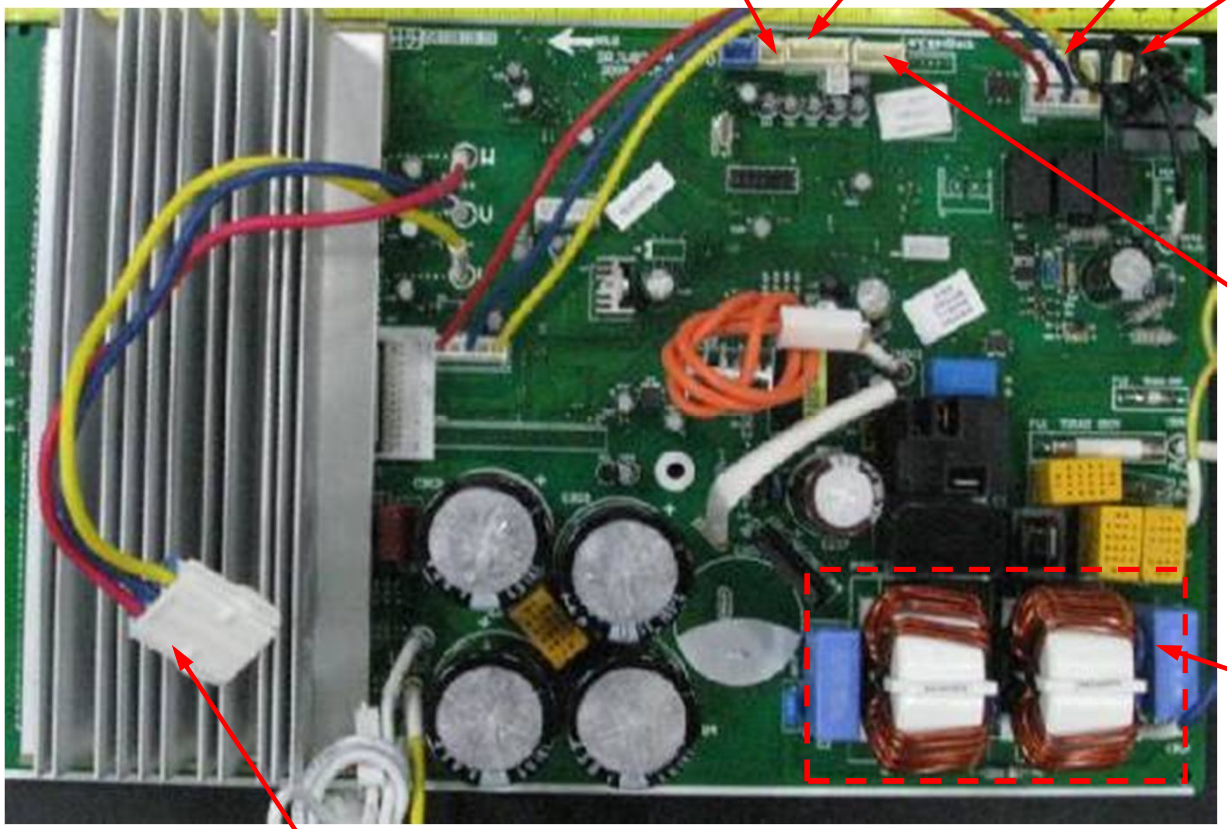
ODU PCB Main Inputs and Outputs Layout

(Outdoor 18/24)

Outdoor controller of model 18/24



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Other issues we need to know

1. Compressor:
   - Model 09/12 use the same one compressor of Single Rotary type.
   - Model 18/22 use the same one compressor of Twin Rotary type.
2. Sensors:
   - CTT: 50K@ 25C
   - OAT/RAT:15K@25C
   - OCT/ICT:20K@25C
3. Motors:
   - IFAN motor is PG motor with 4 speeds respectively for cooling and heating modes.
   - OFAN motor is one speed AC motor controlled by relay.

Main Control Functions

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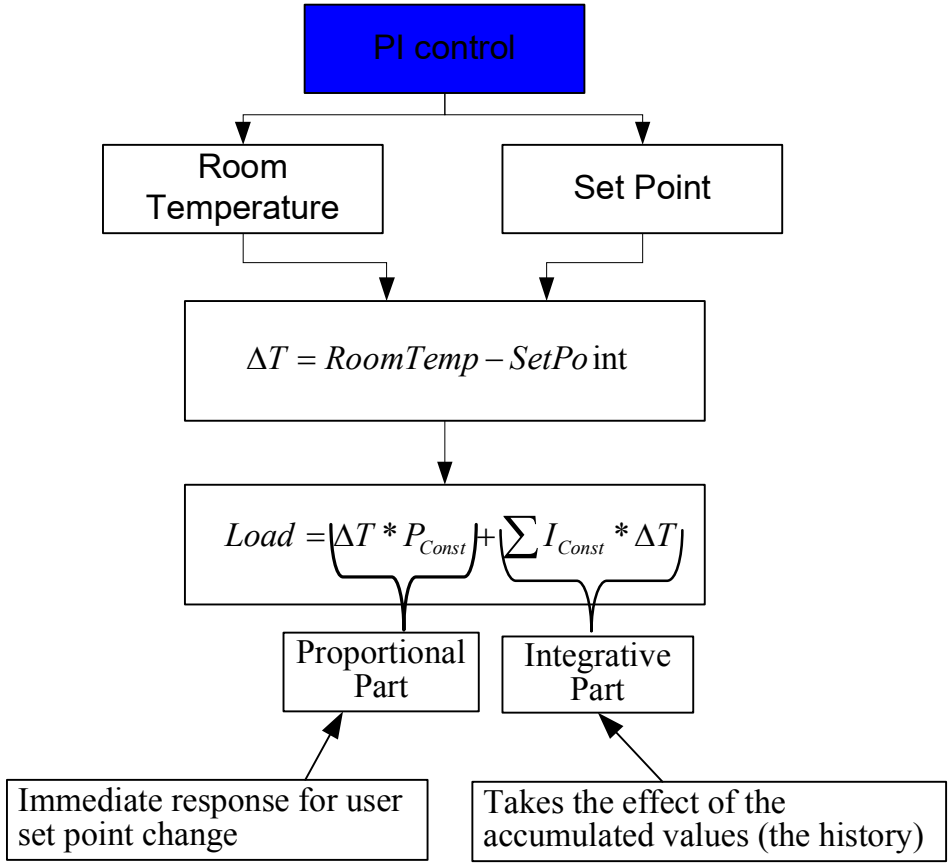
Compressor Target Speed Settings PI.


PI control
Room Temperature
Set Point
$\Delta T = RoomTemp - SetPoint$
$Load = \Delta T * P_{Const} + \sum I_{Const} * \Delta T$
Proportional Part
Integrative Part
Immediate response for user set point change
Takes the effect of the accumulated values (the history)

Example: *Pcoeff*=20, *Icoeff*= 5				
Time	ΔT	Ppart	Ipart	LOAD
0	5	100	0	100
1	5	100	0+25=25	125
2	3	60	25+15=40	100
3	1	20	40+5=45	65
4	0	0	45+0=45	45
5	0	0	45+0=45	45
6	-1	-20	45-5=40	20

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Compressor Min and Max Frequencies

Frequency Range

Mode	Minimum Frequency (MinFreq)				Maximum Frequency (MaxFreq)
	09	**12**	**18**	**24**	See following table
Cooling	*16*	*16*	12	12	
Heating	*16*	*16*	12	12	

Maximum Frequency

Mode	**Sleep Mode**	Maximum Frequency (MaxFreq)			
		09	**12**	**18**	**24**
Cooling	ON	*78*	*92*	80	80
	OFF	*78*	*92*	90	90
Heating	ON	*90*	*95*	90	90
	OFF	*98*	*108*	120	120

Frequency change rate is 1Hz/Sec

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Indoor Fan Control

8 Indoor fan speeds are determined for each model. 4 speeds for COOL modes and 4 speeds for HEAT mode.

Unit Model	Mode	Turbo(Super high)	High	Medium	Low
09	Cooling	1300	1100	900	700
	Heating	1300	1140	980	820
12	Cooling	1350	1150	950	750
	Heating	1350	1190	1020	850

Unit Model	Mode	Turbo(Super high)	High	Medium	Low
18	Cooling	1350	1100	950	800
	Heating	1400	1200	1050	920
24	Cooling	1350	1150	1000	850
	Heating	1350	1150	1000	850

In high/ medium/ low indoor fan user setting, unit will operate fan in selected speed.

Auto Fan Mode

In AutoFan user setting, fan speed will be adjusted automatically according to the difference between actual room temperature(RAT) and user set point temperature(SPT).

Indoor Fan speed		High	Medium	Low
RAT-SPT	Cooling	>=2	(0,2)	<=0
	Heating	<=1	(1,3)	>=3

In DRY mode, the automatic fan speed is forced to be low.

Turbo Function

In COOL and HEAT mode (not available in AUTO, DRY, FAN mode), press the Turbo button, the super high fan speed is selected on Remote control and the indoor fan rotates at super high speed.

Under Turbo mode, IFAN will operate at Super High speed. And outdoor will operate at higher compressor frequency.

Either pressing TURBO button again or selecting other fan speed can cancel the Turbo Mode.

Cooling Mode/ Dry Mode

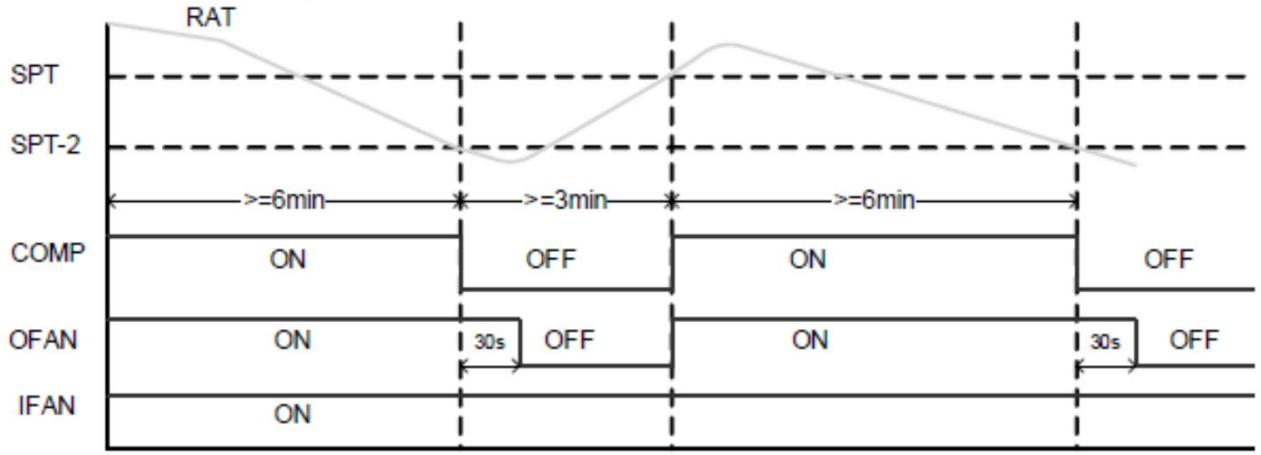
Model 09/12

If RAT≥SPT, the unit starts cooling operation. In this case, the compressor and outdoor fan will operate and the indoor fan will run at the setting speed.
If RAT≤SPT-2, the compressor will stop operation and the outdoor fan will delay 30 seconds to stop. While the indoor fan will run at the setting speed.
If SPT-2<RAT<SPT, the unit will maintain the previous status.

Model 18/24

If RAT≥SPT-0.5, the unit starts cooling operation. In this case, the compressor and outdoor fan will operate and the indoor fan will run at the setting speed.
If RAT≤SPT-2, the compressor will stop operation and the outdoor fan will delay 30 seconds to stop. While the indoor fan will run at the setting speed.
If SPT-2<RAT≤SPT, the unit will maintain the previous status.

DRY MODE: is similar to Cooling mode with following difference. The Indoor Fan speed can not be adjusted under Dry mode and works at low speed



Compressor Min Time Off:3Min
Compressor Min Time ON:6Min

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Heating Mode

Model 09/12

If RAT<SPT+1.5 AND for certain period, the unit will operate in heating mode. The compressor, outdoor fan and 4-way valve will operate and the indoor fan will delay 3min to start at the latest
If RAT≥SPT+1.5, the compressor will stop, the outdoor fan will delay 30s to stop and the indoor fan will blow for 60s at setting speed. During this period, the fan speed can't be switched.

Model 18/22

If RAT≤SPT+3.5, the unit will operate in heating mode. The compressor, outdoor fan and 4-way valve will operate and the indoor fan will delay 3min to start at the latest
If SPT+3≤RAT≤SPT+5,the unit will maintain the previous status.
If RAT≥SPT+5, the compressor will stop, the outdoor fan will delay 30s to stop and the indoor fan will blow for 60s at the setting speed. During this period, the fan speed can't be switched.

Indoor fan speed depends on the indoor coil temperature

Anti-cold air function

When starting the heating mode, anti-cold air function will be activated and indoor fan can run at low speed or stop running. This function will terminate after the unit runs for 3min or the ICT reaches 42 degree.

Residual heat blowing function

During heating, when the stopping condition for the compressor is reached, the compressor and the outdoor fan motor stop running while the louver moves to position L. The indoor fan will stop after running for 60s at setting speed.

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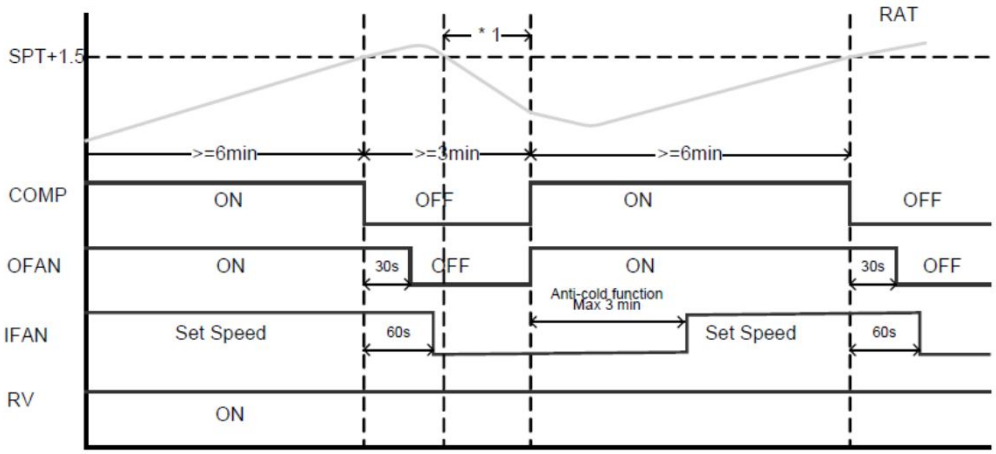
Heating Mode

Models 9/12

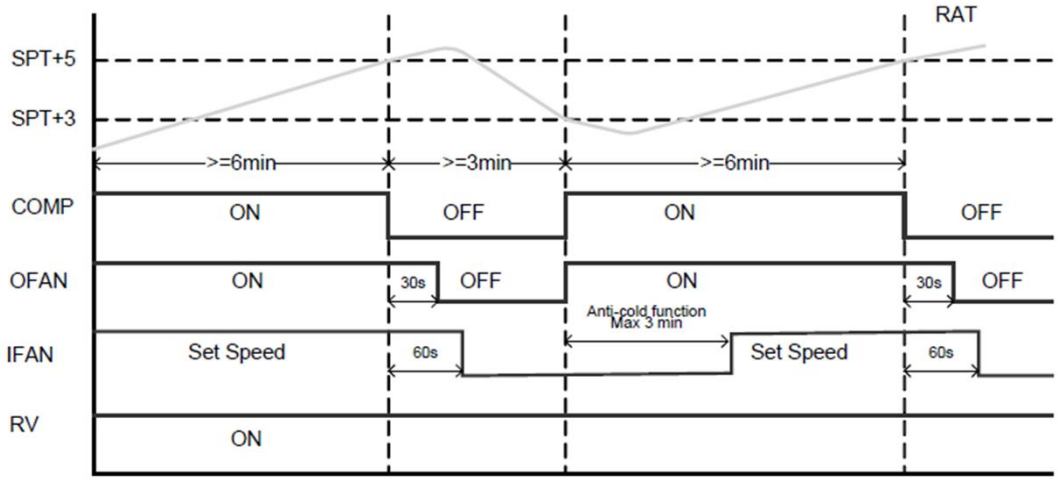


Remark: *1 – accumulated time of RAT<SPT+1.5

Residual heat blowing function:
During heating, when the stopping condition for the compressor is reached, the compressor and the outdoor fan motor stop running while the louver moves to position L. The indoor fan will stop after running for 60s at setting speed.

Anti-cold air function:
When starting the heating mode, anti-cold air function will be activated and indoor fan can run at low speed or stop running. This function will terminate after the unit runs for 3min or the ICT reaches 42 degree.

Models 18/24



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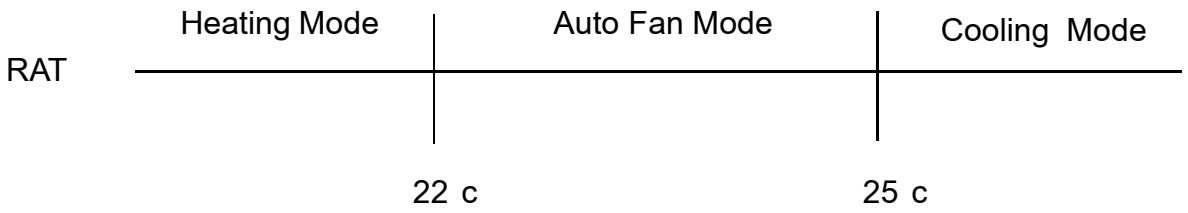
Auto Mode/ Fan Mode

Model 09/12/18/24

In AUTO mode, the system selects the running mode (COOL/HEAT/FAN) automatically according to the room temperature. The display shows the actual running mode and setting temperature. There will be 30s delay for mode conversion.

1. When RAT≥25, the cooling mode is selected.
2. When RAT≤22, the unit runs in heating mode
3. When 22 <RAT< 25, upon initial startup, the unit will enter auto mode and run in automatic fan mode. If the other mode changes into auto mode, the previous running mode will remain.



Fan Mode

In this mode, the indoor fan may run at high, medium, low and automatic speed. The compressor, outdoor fan and 4-way valve will be OFF.

In this mode, the range of setting temperature is 16~30C.

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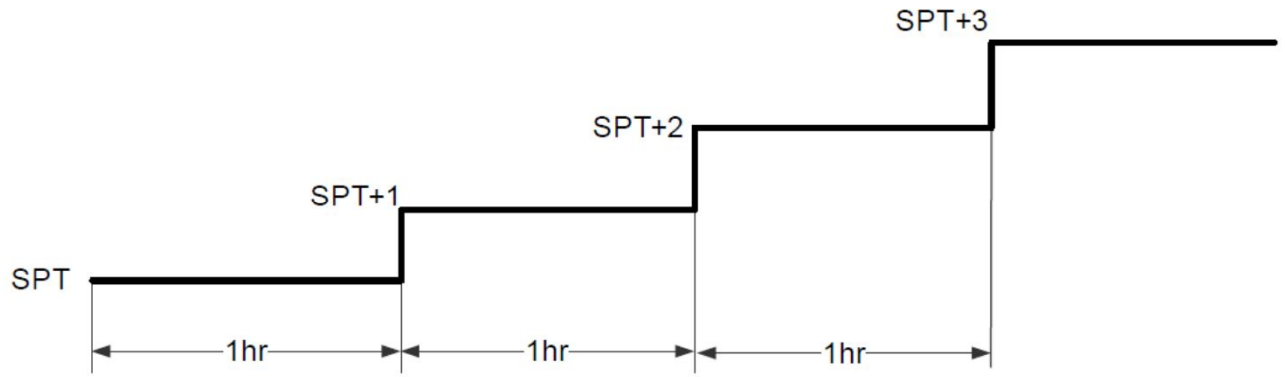
Sleep Mode

Pressing SLEEP button will enable the Sleep function. will be shown on remote control.

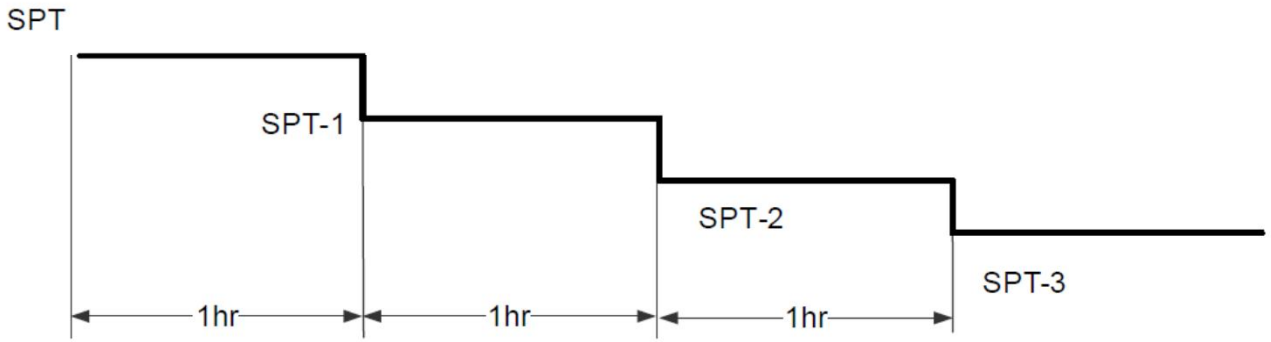
Sleep function in Cool and Dry mode:

The SPT will be adjusted according to following chart.



Sleep function in Heat mode:

The SPT will be adjusted according to following chart.



Press either Sleep button or ON/OFF button can cancel the Sleep function.

Sleep function will not be available in Auto mode or Fan mode.

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Clean Function and I Feel Mode

Clean Function

Clean function enables dring the indoor coil after Cool or Dry mode to avoid mould.

Press CLEAN button in Cool or Dry mode, and the will be shown on remote control.
Under clean function, the indoor fan will continue operation for 10 min at low speed after the unit is turned OFF.

Clean function is defaulted as OFF after unit is Power ON.
Clean function is not available in Auto, Fan or Heat mode.

I Feel -Function

I-Feel function maintains the room temperature by comparing the RCT on remote control.

Pressing IFEEL button will enable the I-Feel function.

will be shown on remote control.
Under I-Feel funtion, remote control sends I-Feel data every 10 min to IDU controller. If the IDU controller does not received I-Feel data after 11 min. I-Feel function will be interrupted and then the AC will work according to RAT on the IDU.
I-Feel function can not be remembered after power failure.

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Protections

There are 4 main protection levels:

1. Normal (Norm) – unit operate normally.
2. Stop Rise (SR) – compressor frequency can not be raised but does not have to be decreased.
3. Hz Down – Compressor frequency is reduced by 2Hz/s.
4. Stop Compressor (SC) – Compressor is stopped.

Stop Rise and Hz Down are related mainly to the following scenarios :

- High Discharge Pressure Protection IDU/ODU.
- Over Current Protection.
- Heat Sink Temp'.
- IDU coil is Freezing.

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Protections

IDU Coil Overheating protection (heating mode):
During heating operation, the signals being sent from the indoor unit allows the operation of frequency limitation in order to prevent abnormal high pressure.

For Model 09/12: Compressor will stop when ICT reaches 65C
For Model 18/22, Compressor will stop when ICT reaches 62C

If the unit stops as such protection for 6 times, it can not resume running automatically and displayed an error malfunction, it can resume by pressing ON/OFF.

IDU Freezing Protection:
During cooling operation, the signals being sent from the indoor unit allow the operating frequency limitation and then prevent freezing of the indoor heat exchanger.

Compressor will stop when ICT <= -1 for continuous of 3 min.

If the unit stops as such protection for 6 times, it can not resume running automatically and display malfunction, it can resume by pressing ON/OFF.

Protections

Compressor Over Current Protection:

Model 09/12: Compressor will stop when AC current reaches 14.0A for continuously 2.5s.
Model 18/22: Compressor will stop when AC current reaches 17.0A for continuously 2.5s.

If the unit stops as such protection for 6 times, it can not resume running automatically and display malfunction, it can resume by pressing ON/OFF.

Compressor Overload Protection:

The Discharging temperature is used for detecting the comp' temp'. If the discharge temperature rises above a certain level, the operating frequency upper limit is set to keep this temperature from going up further.

Model 09/12 : Compressor will stop when CTT reaches certain value (see following table)

Compressor frequency (Hz)	CTT temperature (Stop compressor)
>50	110 °C
[39,50]	105 °C
<39	100 °C

Model 18/24 : Compressor will stop when CTT reaches 115C

If the unit stops as such protection for 6 times, it can not resume running automatically and display malfunction, it can be resumed by pressing ON/OFF.

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Protections

Deicing Procedure:

This protection is for Heat Pump Only
This protection is carried out by the cooling cycle (reverse cycle). The defrosting time or outdoor heat exchanger temperature must be more than its setting values when finishing the deicing protection.
In the deicing protection, IFAN is forced OFF.

Deicing Starting Conditions:

The starting conditions is a function of OAT and (OCT). Under the conditions that the system is in heating operation for certain period (Accumulated time)
Deicing interval time is changed as a function of deicing time. If deicing time is shorter than former deicing time, the deicing interval time will be increased. If deicing time is longer than former deicing time, the deicing interval time will be decreased .

Exiting Deicing:

System will exit the deicing until OCT reaches to certain value (depends on OAT) or the deicing time reaches Maximum Deicing Time.

For 18/24:

- OCT≤12°C

or

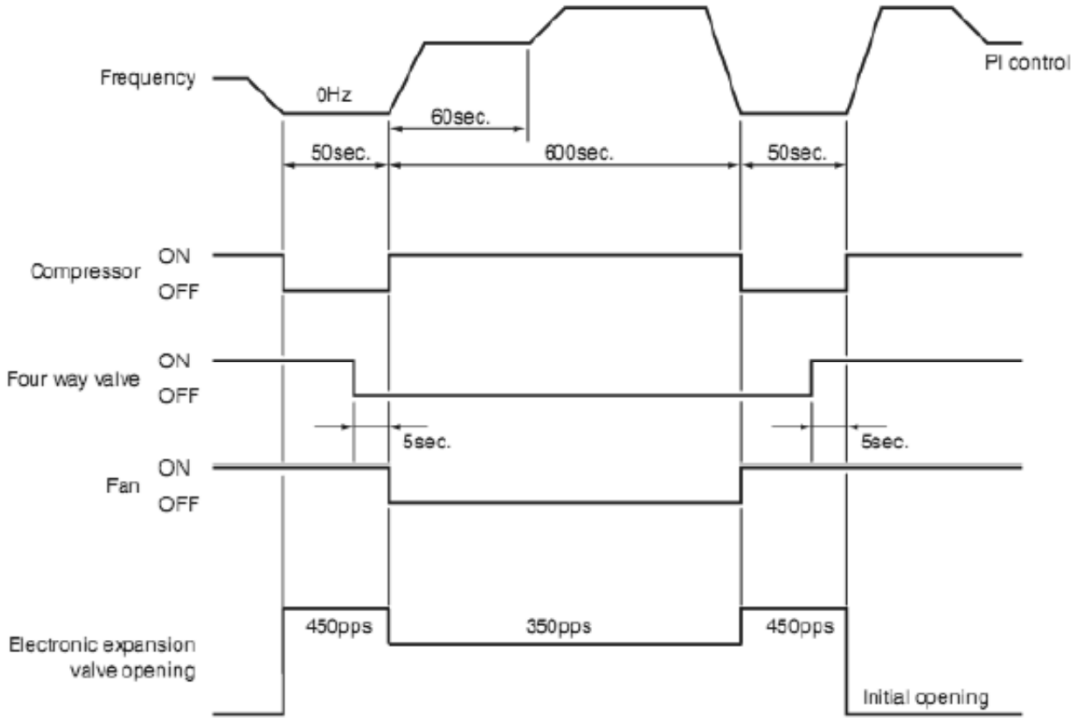
- OAT<5°C and OCT≥6°C lasts for more then 80Sec

Maximum De-icing Time:

Model 09/12 -10 Min
Model 18/22 - 8Min

Protections

9/12 Deicing Procedure:



18/24 models:

- Start to defrost: Compressor stops and starts up 55S later
- Start to defrost: Outdoor fan will stop after compressor stops for 50S.
- Defrosting finish: Compressor stops and starts up 55S later.
- Defrosting finish: Outdoor fan will start up when the compressor is stopping.

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Protections

AC Voltage Drop:

During compressor operation, the system will stop in case of an AC voltage malfunction the unit will resume its operation automatically after 3min.

Communication malfunction:

If the unit does not receive correct signal from indoor unit for 3min continuously, the unit will stop and will show communication malfunction protection; if the communication malfunction had been resumed and the compressor had stopped for a period of 3min, the unit will restart its operation.

IPM module Protection:

When the compressor starts, if there is an over current status or low DC voltage on the IPM module, IPM module will issue a protection signal. Once the signal is detected, the unit will be stopped immediately.

If the module protection is resumed and compressor has stopped for at least 3min, the unit will be allowed to restart.

If the module protection continuously occurs for 3 times, it will not be resumed automatically, and can be started by ON/OFF button only.

Heat Sink Protection:

If the module temperature is higher than 100°C, the unit will stop. once the temperature will be lower than 100°C, and the compressor has stopped for 3min, the unit will resume its operation.

If the unit stops on heat sink fault for 6 times, it can not be resume automatically and error code will be displayed and the unit can be reset by using ON/OFF button only.

Refrigerant Control Concept

For Models 09/12/18 capillary method is used.

EEV is used only on Model 24:

1. **EEV operation after power-on**: When power on, EEV will open 240 steps and then move back with 540steps. This position will be recognized as 0. Then EEV will open to 480 steps and be ready for system operating.
2. **EEV open loop:** depends on OAT,RAT,SPT and compressor frequency after compressor starts to operate.
3. **Target CTT control:** will be performed after compressor operates for 5min.The EEV opening will be updated every 5s.

Test Mode Procedure

Models 9/12:

Test mode(Mode of testing capacity) can be achieved through special remote control settings as following table depends on models:

Model	Mode (Shown on display)	Settings of Remote control		Operation of Remote control	Display (2*7 segments)
		Cooling	Heating		
09/12	P0(Minimum capacity)	SPT=16	SPT=27	Press "Sleep" button 4 times in 3 sec.	Show "P0"
	P1(Norminal capacity)	SPT=18	SPT=29		Show "P1"
	P2(Maximum capacity)	SPT=19	SPT=30		Show "P2"
	P3(Medium capacity)	SPT=17	SPT=28		Show "P3"

11.14.2 Unit Operation in Test Mode

Compressor frequency will be set in the following ways:

Model		09	12
P0(Minimum capacity)	Cooling	16Hz	16Hz
	Heating	24Hz	28Hz
P1(Norminal capacity)	Cooling	53Hz	67Hz
	Heating	72Hz	80Hz
P2(Maximum capacity)	Cooling	78Hz	92Hz
	Heating	98Hz	108Hz
P3(Medium capacity)	Cooling	22Hz	30Hz
	Heating	35Hz	40Hz

IFAN speed can be adjusted during test mode.

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Test Mode Procedure

Models 18/24:

Test mode(Mode of testing capacity) can be achieved through special remote control settings as following table depends on models:

Model	Mode (Shown on display)	Settings of Remote control		Operation of Remote control	Display (2*7 segments)
		Cooling	Heating		
18/22	Setting frequecy to XY Hz	Timer OFF= (10+X)(hrs) SPT=20+Y Setting frequency=10*X+Y		Press "Sleep" button 4 times in 3 secs.	Show XY (Frequency) *1

Remark: *1 – 2*7 segments display can only show lower 2 digits of number.

Example of frequency setting on 18/24
To set the frequency=105Hz, following settings should be done.
105=10*10+5 (here the X=10, Y=5)
Settings on remote control:
Timer Off =10+X=20
SPT=20+Y=25
Press **"Sleep"** button 4 times in 3 secs and compressor will operate with 105Hz. Display will show "05"

Compressor frequency will be set in the following ways:

Model		18	22
P0(Minimum capacity)	Cooling	15Hz	15Hz
	Heating	15Hz	15Hz
P1(Norminal capacity)	Cooling	83Hz	83Hz
	Heating	66Hz	75Hz
P2(Maximum capacity)	Cooling	100Hz	100Hz
	Heating	96Hz	96Hz
P3(Medium capacity)	Cooling	34Hz	36Hz
	Heating	33Hz	37Hz

IFAN speed can be adjusted during test mode.

Forced Cooling Mode

18/24 Models Only:

Entering into forced mode :
After the unit is powered for 5mins, press the light button on remote controller for 3 times in 3s successively to enter into Freon recovery mode. Fo will be displayed. When Freon recovery mode operated for 25mins, all loads will operate in cooling mode. (The setting fan speed is high fan speed and the setting temperature is 16C)

Exiting forced mode:
Any signal from remote controller or button will exit the forced mode, and then the unit will operate at the current setting command.
Forced mode will also be exited after operating for 25mins and then the unit will be turned off.

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Error Failure Code list and Probable Cause

Diagnostic from IDU Display:

If the malfunction still exists 4min later after the unit had stopped due to compressor protection, an error code will be directly displayed through the indoor display. In other situations, error code can be displayed by pressing LIGHT button 6 times within 4s.

The Fault codes can be displayed by 2*7 segments (on IDU Display board)
Blinking of IDU LEDs (RUN,COOL,HEAT) can also show the information of fault code.

For Models 18/24 diagnostic can be also detected from the outdoor by a combination of LEDs located on the controller.

Leds Status:

□ **- LED OFF**
■ **- LED ON**
☆ **- LED BLINK**

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Error Failure Code list and Probable Cause

Sample of 18/24 **□ - LED OFF / ■ - LED ON / ☆ - LED BLINK**

Indoor indicators		Outdoor indicators				Failure	Possible Reasons/Corrective actions
2* 7 segments	LEDs (RUN,COOL,HEAT)	D40	D41	D42	D43		
E1	RUN OFF 3s and blink once	□	☆	☆	☆	HP Switch protection	•Refrigerant was superabundant •Poor heat exchange (including blockage and bad radiating environment) •Too high ambient temperature
E2	RUN OFF 3s and blink 2 times	■	□	■	□	Indoor coil defrost protection	•Poor air-return in indoor unit •Fan speed is abnormal •Evaporator is dirty.
E4	RUN OFF 3s and blink 4 times	■	□	■	☆	Compressor over Heating Protection	•EEV connection problem or damage •Refrigerant leakage •Poor heat exchange
E5	RUN OFF 3s and blink 5 times	□	■	☆	□	Over current protection	1.Supply voltage is unstable 2.Supply voltage is too low and load is too high
E6	RUN OFF 3s and blink 6 times	□	□	□	☆	Communication malfunction	1.Wiring mistakes 2.IDU or ODU PCB problem
E8	RUN OFF 3s and blink 8 times	■	□	■	■	Indoor coil/Outdoor coil over heating protection	•Too high ambient temperature •Poor heat exchange (including blockage and bad radiating environment)
U8	RUN OFF 3s and blink 17 times					Zero-crossing protection (IDU)	•IFAN motor damaged •Zero-crossing circuit damaged on IDU PCB
H6	RUN OFF 3s and blink 11 times					No feedback of indoor motor	1.IFAN motor damaged 2.IFAN motor blocked 3.IDU PCB problem
C5	RUN OFF 3s and blink 15 times					Malfunction protection of jumper cap	Poor connection of the jumper on indoor PCB.

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Error Failure Code list and Probable Cause

Sample of 18/24 **□ - LED OFF / ■ - LED ON / ☆ - LED BLINK**

Indoor indicators		Outdoor indicators				Failure	Possible Reasons/Corrective actions
2* 7 segments	LEDs (RUN,COOL,HEAT)	D40	D41	D42	D43		
F1	COOL OFF 3S and blink once					RAT failure	1.Senor was broken or damaged 2.PCB temperature detection circuit has problem
F2	COOL OFF 3S and blink twice					ICT failure	
F3	COOL OFF 3S and blink 3 times	□	□	☆	■	OAT failure	
F4	COOL OFF 3S and blink 4 times	□	□	☆	□	OCT failure	
F5	COOL OFF 3S and blink 5 times	□	□	☆	☆	CTT failure	
F6	COOL OFF 3S and blink for 6 times	■	□	☆	☆	HZ down due to overload	1.Too high ambient temperature 2.Poor heat exchange (including blockage and bad radiating environment)
F8	COOL OFF 3S and blink 8 times	■	■	□	■	Hz down due to over current	1.Power supply voltage is too low 2.Higher system pressure and overload
F9	COOL OFF 3S and blink 9 times	■	■	□	□	Hz down due to high air discharging	•Overload or temperature is too high •Insufficient refrigerant •EEV Problem
PH	COOL OFF 3S and blink 11 times	□	■	□	☆	DC over voltage	•AC power supply is higher than 265V •Outdoor PCB circuit malfunction
U5	COOL OFF 3S and blink 13 times	□	■	☆	■	AC Current detection problem	Outdoor PCB problem, replace the outdoor controller.

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Error Failure Code list and Probable Cause

□ - LED OFF / ■ - LED ON / ☆ - LED BLINK

Indoor indicators		Outdoor indicators				Failure	Possible Reasons/Corrective actions
2* 7 segments	LEDs (RUN,COOL,HEAT)	D40	D41	D42	D43		
P5	COOL OFF 3S and blink 15 times	□	☆	□	□	Compressor phase DC over current protection	•Abnormal power input voltage. •Compressor wiring mistake. •Liquid and gas valve are not open. •EEV damaged or not proper working •Poor heat exchange. •Over charged system.
H1	HEAT OFF 3S and blink once					Deicing	Normal function during heating
H2	HEAT OFF 3S and blink twice					ESF protection	
H3	HEAT OFF 3S and blink 3 times	□	☆	☆	□	Compressor overload protection	•Connection of compressor OLP is loosen (the resistance for this terminal should be less than 1ohm) •EEV connection problem or damaged/Capillary problem •Refrigerant leakage
H4	HEAT OFF 3S and blink 4 times	■	□	■	■	System is abnormal	•Too high ambient temperature •Poor heat exchange (including blockage and bad radiating environment)
H5	HEAT OFF 3S and blink 5 times	□	☆	☆	□	IPM protection	•Abnormal power input voltage. •Compressor wiring mistake. •Liquid and gas valve are not open. •EEV damaged or not proper working •Poor heat exchange. •Over charged system.

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Error Failure Code list and Probable Cause

□ - LED OFF / ■ - LED ON / ☆ - LED BLINK

Indoor indicators		Outdoor indicators				Failure	Possible Reasons/Corrective actions
2* 7 segments	LEDs (RUN,COOL,HEAT)	D40	D41	D42	D43		
HC	HEAT OFF 3S and blink 6 times	□	■	☆	☆	PFC protection	1.PFC module assembly problem. 2.Poor heat exchange of Heatsink 3.PFC reactor problem. 4.Abnormal power voltage 5.PFC circuit problem on PCB
H7	HEAT OFF 3S and blink 7 times	□	☆	■	☆	Desynchronizing of compressor	•Abnormal power input voltage. •Compressor wiring mistake. •Liquid and gas valve are not open. •EEV damaged or not proper working •Poor heat exchange. •Over charged system.。
H0	HEAT OFF 3S and blink 10 times	■	□	☆	☆	HZ down due to IDU over heating protection	1.Too high ambient temperature 2.Poor heat exchange (including blockage and bad radiating environment)
Lc	HEAT OFF 3s and blink 11 times	□	☆	□	☆	Start-up failure	•Compressor wiring mistake •Over charged system •System not balanced before compressor starting •Compressor problem
U1	HEAT OFF 3s and blink 13 times	□	☆	■	□	Malfunction of phase current detection circuit for compressor	Phase current detection circuit for compressor has problem.
EE	HEAT OFF 3s and blink 15 times	□	□	□	■	EEPROM failure	Replace indoor controller
PU	HEAT OFF 3S and blink 17 times	□	■	□	■	Charging malfunction of capacitor	•Reactor open •Charging relay or other components damaged on PCB.

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Error Failure Code list and Probable Cause

□ - LED OFF / ■ - LED ON / ☆ - LED BLINK

Indoor indicators		Outdoor indicators				Failure	Possible Reasons/Corrective actions
2* 7 segments	LEDs (RUN,COOL,HEAT)	D40	D41	D42	D43		
P7	HEAT OFF 3s and blink 18 times	□	□	■	☆	HST failure	Replace outdoor controller
P8	HEAT OFF 3s and blink 19 times	■	□	☆	■	HST over heating protection	•Insufficient grease on heat sink or poor connection of heat sink to PCB •Outdoor PCB problem.
U3	HEAT OFF 3s and blink 20 times	□	■	■	■	Malfunction of voltage dropping for DC BUS	Supply voltage is unstable
PL	HEAT OFF 3S and blink 21 times	□	■	■	□	DC under voltage	•AC power supply voltage is less than 150VAC •Outdoor PCB circuit malfunction
EU		■	■	■	☆	Stop rise/HZ down due to HST over heating protection	•Insufficient grease on heat sink or poor connection of heat sink to PCB •Outdoor PCB problem.
U7		■	□	☆	□	The RV is abnormal	1.Supply voltage is lower than AC175V 2.Wiring terminal of RV is loosen or broken 3.RV is damaged
U9		■	■	☆	□	Zero-crossing protection (ODU)	Replace outdoor controller
FH		■	■	■	□	Stop rise/HZ down due to IDU defrosting protection	1.Poor air-return in indoor unit 2.Fan speed is abnormal 3.Evaporator is dirty.

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END

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